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Emily Brumit  
Illinois Commerce Commission  
527 E. Capitol Avenue  
Springfield, IL 62701

Ritta Merza  
Illinois Commerce Commission  
527 E. Capitol Avenue  
Springfield, IL 62701

Katharine McErlean  
Illinois Commerce Commission  
527 E. Capitol Avenue,  
Springfield, IL 62701

Jennifer Morris  
Illinois Commerce Commission  
527 E. Capitol Avenue,  
Springfield, IL 62701

RE: Notice of Inquiry Regarding Electric Vehicles

Dear Illinois Commerce Commission:

Tesla appreciates the opportunity to provide feedback on Notice of Inquiry (NOI) issued by the Illinois Commerce Commission (ICC) to better understand and identify the issues, potential challenges, and opportunities in electric vehicle (EV) deployment. Tesla's mission is to accelerate the adoption of sustainable energy by developing and manufacturing the world's most advanced electric vehicles, and electric vehicle charging stations, among other clean energy products and services. Tesla has also established a worldwide presence of sales and service centers and charging stations. In Illinois, Tesla currently has 5 service and store locations, 18 Supercharger stations with a total of 164 Supercharger stall capable of providing 170 miles in 30 minutes, and approximately 100 level 2 charging stations as part of its Destination Charging network.

As the NOI highlights by referencing Bloomberg NEF's recent outlook, a significant portion of new vehicles sales will be electric by 2040. The Rocky Mountain Institute (RMI) also recently released a report<sup>1</sup> looking at the growth trends, costs, and benefits of electric vehicles by taking a survey of various studies from around the nation. It is RMI's view that the electric vehicle revolution is here and is growing. RMI notes that EV sales have grown on average 32% year over year for the past four years and believes this trend should only continue to accelerate with the advancement of the necessary infrastructure and programs to support EVs. However, with the large percentage growth in EV sales, EVs still only makes up 1% of total vehicle sales as of 2016.<sup>2</sup> There are many

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<sup>1</sup> Fitzgerald, Garrett and Chris Nelder. From Gas to Grid: Building Charging Infrastructure to Power Electric Vehicle Demand. Rocky Mountain Institute, 2017. [https://www.rmi.org/insights/reports/from\\_gas\\_to\\_grid](https://www.rmi.org/insights/reports/from_gas_to_grid)

<sup>2</sup> *Id.* Executive Summary

steps regulators and stakeholders alike can take to accelerate EV adoption. Moreover, by increasing the number of EVs, the state can also maximize benefits and energy cost savings for everyone.

The NOI also notes that “panelists agreed that inefficient, uncoordinated charging is the most pressing challenge relating to EV penetration today.”<sup>3</sup> While Tesla agrees with the premise that there’s value to coordinating EV charging, especially at higher levels of EV penetration well beyond current levels, we respectfully disagree that it is the most pressing challenge related to EV adoption today. One of the most significant barriers, beyond cost of EVs, is access to EV charging infrastructure. Therefore, our comments below focus on three fundamental areas that can help drive EV adoption, which include education and awareness, EV charging station development, and developing rates that reduce the total cost of owning an EV. While our comments in this context apply primarily to the light-duty EV market, medium- and heavy-duty EVs are also important areas to evaluate in the context of transportation electrification and similar barriers to charging infrastructure will apply from a cost and operational perspective.<sup>4</sup>

The NOI further recognizes that “because EV adoption in Illinois is still in the early stages, Illinois EV Regulatory framework is also in its infancy... regulatory uncertainty discourages utilities and customers from participating at a larger scale.”<sup>5</sup> In considering how to overcome barriers to EV deployment in Illinois, the NOI should be utilized as a first step toward providing a regulatory framework that creates certainty. Using a collaborative process with clear timelines and incorporating the many perspectives of EV stakeholders, with utilities and policy makers at the center, will help educate and steer Illinois in developing programs that encourage EV adoption and savings in the state—as the growth of EVs complements established objectives in Illinois of promoting clean energy and reducing greenhouse gas emissions. Electrifying other market segments like transportation and EVs will enhance the value and integration of renewables, while also improving the utilization of the grid with minimal investments.

Tesla looks forward to collaborating further with the Commission and stakeholders on this effort to help drive EV adoption in Illinois.

#### Energy Efficiency:

##### ***A. Do EVs contribute to energy efficiency in Illinois by relying on electricity instead of fossil fuels? If so, how?***

EVs can contribute to energy efficiency and energy conservation in Illinois since EVs are inherently more energy efficient than internal combustion engine (ICE) vehicles, and therefore have the ability to reduce overall energy usage for the state.

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<sup>3</sup> 18-NOI-01. Illinois Commerce Commission. Page 2.

<sup>4</sup> If specific input and information on the heavy-duty EV space would be useful to the Commission, Tesla would be happy to provide additional feedback in reply comments.

<sup>5</sup> 18-NOI-01. Illinois Commerce Commission. Page 3.

For example, Tesla's 2018 models have Environmental Protection Agency (EPA) fuel efficiency ratings of between 85 and 130 miles per gallon-equivalent (MPGe),<sup>6</sup> while the Bureau of Labor Statistics reported that average fuel economy of light-duty vehicles is about 24 miles per gallon (MPG).<sup>7</sup> The EPA developed the MPGe metric to provide an apples-to-apples comparison of the relative efficiency of an electric vehicle to an ICE vehicle. The EPA uses 33.7 kilowatt hours as the equivalent energy content of 1 gallon of gasoline. To further compare whether EVs can reduce energy consumption, upstream energy consumption from the electricity generation sector can be considered.

Using the large Tesla Model S sedan, which has an EPA rating of approximately 100 MPGe, as an example, shows that the vehicle is 4.16 times more efficient than the average ICE vehicle on the road today. Put another way, driving a Tesla Model S reduces total energy use relative to an average ICE vehicle as long as the upstream electricity sector is more than 24 percent efficient at converting energy to electricity (and associated losses during transmission of that electricity). According to the latest Energy Information Administration (EIA) data, Illinois's electricity generation fleet is much more efficient, with the state's combined fossil fleet operating at over 32.7% efficiency, meaning EVs consume less energy than ICE vehicles.<sup>8</sup>

***B. Describe whether and how EV charging stations will affect overall energy efficiency in Illinois.***

EVs and EV charging stations can complement Illinois' energy efficiency efforts. Outside of the traditional sense of doing more with less, EV charging stations and EVs can help with demand management and better utilization of the electric grid's fixed infrastructure. EV charging can be more effectively integrated via price signals such as time-of-use (TOU) rates that incentivize charging at times that are beneficial to the grid and at the same time drive cost savings for consumers.

***a. Describe whether and how development of additional charging infrastructure will affect overall energy efficiency in Illinois.***

Development of additional charging infrastructure will not have a negative impact on overall energy efficiency in Illinois when strategies to drive EV adoption and transportation electrification are pursued in parallel with existing efficiency efforts.

Utilities have used a range of tools to incent beneficial energy behavior through energy efficiency and price signals to enable better utilization of their systems. These tools can easily be adopted in the short term to help guide all stakeholders on a path to the insights and data collection needed to develop programs in the state that encourage EV adoption and better utilization of the electric grid.

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<sup>6</sup> Fuel Economy of 2018 Tesla Vehicles. U.S. Department of Energy. <https://www.fueleconomy.gov/feg/bymake/Tesla2018.shtml>

<sup>7</sup> Average Fuel Efficiency of U.S. Light Duty Vehicles. Bureau of Transportation Statistics. <https://www.bts.gov/content/average-fuel-efficiency-us-light-duty-vehicles>

<sup>8</sup> EIA, 2017 Net Generation by State by Type of Producer by Energy Source (data from Form EIA-923), and 2017 Fuel Consumption for Electricity Generation by Year, Industry Type and State (data from Form EIA-923). To calculate the heat rate, the total energy consumed for electricity (in MMBTU) at Illinois' fossil fuel power plants (non-nuclear coal, renewables or storage) were divided by the total energy produced (MWh) at the same Illinois power plants. To calculate the efficiency, energy content of a kWh (3412 BTU/kWh) was divided by the heat rate (10440 BTU/kWh).

## Grid Reliability and Resilience:

### ***A. Describe whether and how EVs will improve grid reliability and resilience.***

As discussed further in the comments below and reported by MJ Bradley & Associates, EVs can provide benefits to all ratepayers. EV load provides unique characteristics different from traditional load coming online, such as a new residence or commercial building. For example, EV load is distributed and flexible where it can be shifted to different times of the day when costs of the electric grid are lowest. Encouraging EVs to charge in a way that does not increase a utility system's peak is beneficial load that complements efforts of other demand reducing activities that are less flexible, such as reducing overall demand of a building via energy efficiency.

Additionally, in a state where EVs are most prevalent such as California, it has been proven that the incremental demand that these EVs add to the utilities system is negligible. For example, over the last five years in the CA three major investor owned utilities, less than 0.2 percent of EVs have necessitated utility infrastructure upgrades. The utilities found that the total amount of utility expenditures for system updates due to EVs accounted for only \$610,000 of over \$5 billion in distribution system upgrades.<sup>9</sup>

A major concern that may be brought forward regarding new EV load is that it will dampen the benefits of demand reducing activity as that activity generally avoids the need for increased utility infrastructure and capacity, which can raise costs for ratepayers. As mentioned above, however, the flexibility and distribution of this load mitigates this concern and the experience in California, with the highest EV ownership rates of any state, proves that even with minimal system planning or programs in place for EVs, this added load is not a concern and in most cases a benefit via its presence. EVs should, therefore, be viewed as beneficial and not in conflict with energy efficiency goals.

### ***B. Identify best charging practices and whether and how they can relieve pressure on the grid during peak-demand times, as well as relieve pressure on individual circuits.***

See above response to question A.

In addition, research has shown that 80% of EV charging occurs at home, which is much different than driving to a gas station for fuel. Most cars sit idle for more than 20 hours a day while people are at stores, at work, and at home. That presents an opportune time to charge a vehicle. Tesla has adopted a philosophy of "Charge Where You Park" in which we believe it is best to have charging options at home, work, around town where people shop and dine, and along highway corridors. While Tesla has built an extensive Supercharger network, we believe the best way to charge is Level 2 while the car is sitting idle at home in the evenings when excess grid capacity is greatest. With the concept of "Charge Where You Park" in mind and the importance of access to Level 2 charging, managed charging through TOU rates when properly designed can serve as the building block for any grid integration strategy.

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<sup>9</sup> Avi Allison and Melissa Whited. Electric Vehicles Are Not Crashing the Grid: Lessons from California. Synapse Energy, November 2017. Page 2. [http://www.synapse-energy.com/sites/default/files/EVs-Not-Crashing-Grid-17-025\\_0.pdf](http://www.synapse-energy.com/sites/default/files/EVs-Not-Crashing-Grid-17-025_0.pdf)

***a. Describe whether and how transportation electrification in the public and non-residential sectors will affect the load on the electric grid.***

Tesla does not have any comment at this time.

***C. Describe whether and how development of additional charging infrastructure will affect grid reliability and resilience.***

At current levels of EV penetration at less than 5 percent of all vehicles, studies have demonstrated that EV integration impact on the distribution grid is minimal. For example, as referenced above, in California, approximately 0.2 percent of what the utilities spend annually to maintain the distribution system is due EV load integration.<sup>10</sup>

At the same time, for direct current fast charging (DCFC) sites, such as Tesla's Superchargers, the majority are separately metered and go through a new service request process just like every other commercial customer. Through that process the utility determines whether upgrades are required, and if they are, the customer may need to pay for that upgrade if it is more expensive than the allowance outlined in the utility tariff.

***D. What other types of technology can be used to support grid reliability and resilience with continued electrification of the transportation sector?***

Currently, the most important focus should be on increasing EV deployment, which can be done most effectively by increasing access to charging infrastructure and providing price signals via rates. Taking lessons and trends from today and utilizing a phased-in approach to implement EV or electrification of transportation programs will be more effective and less costly than trying to solve for programs that may be best leveraged in 2030 or 2050 or in a future state with millions of EVs. The EV market is still in its early stages of development, and adoption is reliant upon consumer investments in these vehicles. Therefore, it is important to keep the customer experience in mind, and to solve the fundamental issues impacting EV adoption first, as opposed to adopting solutions with the potential to increase the cost of EV ownership.

Piloting opportunities to pair renewables including solar and storage with EV charging will be helpful for future integration but should not be the primary focus of any Commission efforts today. At the same time, creating complex charging programs with software and hardware requirements to do more sophisticated load management at a large scale is unnecessary until the cost and benefits of such requirements have been quantified and EV deployment reaches higher levels. Programs, such as demand response, do not need to be designed for a specific technology but rather with a specific end-result that provides benefits to ratepayers and the grid and is agnostic to the technology that is utilized to achieve the end goal.

***E. Do vehicle-to-grid capabilities need to be enabled in order for EVs to provide grid support?***

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<sup>10</sup> Garcia, Noah. Good News: EVs Are Not Crashing the Grid. NRDC, December 2017. <https://www.nrdc.org/experts/noah-garcia/good-news-evs-are-not-crashing-grid>

Prior to embarking on any discussions for programs to enable vehicle to grid capabilities it is important to establish standard definitions of the terms associated vehicle grid integration (VGI) including distinguishing between V1G (one-way) and V2G (bidirectional). In California, for instance, the VGI working group, developed a standard glossary of terms that could be utilized by all stakeholders to communicate effectively about which elements of VGI they were discussing.

Second, it is important to determine what types of grid support can be provided by EVs and under what specific charging use cases (work, home, fleet, etc.) it makes sense to provide a certain type of service. Regulators should also be careful to not adopt any unnecessary requirements for enabling vehicle to grid capabilities prior to analyzing the costs and benefits for various charging use cases. There are other strategies available today such as price signals and existing demand response programs that provide grid support and do not require any complex technological capabilities to be enabled prior to providing benefit.

In the future, when more complex programs are being developed, customer experience considerations should be at the forefront, and programs should be opt-in. Today, however, creating customer price signals via TOU rates and encouraging Level 2 charging where vehicles are parked for several hours, will provide the most valuable grid benefits for integrating EVs.

***F. What control by the utility is necessary to ensure reliability and efficient operation of the grid?***

In the context of EVs and charging infrastructure, the utility will need to have general insight and data on vehicle purchases and usage behavior, which is no different than the insights needed on other types of customers (retail, schools, homes, etc.) The information will help the utility understand and manage the needs of the customers.

For example, currently, utilities lack visibility about who owns an EV in their service territory and how they are charging. Increasing visibility into EV ownership and charging behavior is important. Like EVs themselves, every utility's electric power system is unique, so it is important not only for utilities to gain foundational insights into their own customer EV trends, but the insights are also important for other stakeholders, such as charging station developers. Given privacy agreements between customers and auto manufacturers and retailers, utilities can offer customers a nominal rebate for registering their EV with the utility as a way to increase visibility of EV location. Indeed, customers can already register their vehicles with ComEd via the company's website.<sup>11</sup> Once there is visibility on EV ownership, electricity usage patterns can come through the existing utility meter infrastructure. The data can also help steer customers to programs that optimize and increase the utilization of the electric power system such as TOU rates.

***G. Identify cybersecurity implications, if any, of widespread EV adoption.***

Tesla does not have any comment at this time.

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<sup>11</sup> Register your Electric Vehicle. ComED.  
<https://secure.comed.com/SmartEnergy/SmartMeterSmartGrid/Pages/RegisterYourElectronicVehicle.aspx>

***a. Discuss the potential for EVs to be a vector for smart grid control network penetration.***

Tesla does not have any comment at this time.

***b. Discuss the potential for EVs to be vector for causing physical disruptions if charging and discharging is coordinated in a malicious manner as part of a botnet under the control of malicious actors.***

Tesla does not have any comment at this time.

Barriers:

***A. Describe regulatory barriers to increased electrification of the transportation sector.***

There are several factors that impact both regulatory and economic barriers for transportation electrification. This includes the following items:

- Investment in make-ready infrastructure<sup>12</sup>
- Ability for utilities to earn a rate of return or recover the costs on make-ready infrastructure investments
- Price signals via electric rates for nascent markets
- Total cost of ownership for EVs and charging infrastructure
- New service requests and development process for charging infrastructure deployment

Numerous reports have outlined the barriers to transportation electrification especially for the light-duty market and provide a more detailed analysis of the issues listed above. These include studies by RMI,<sup>13</sup> UC Berkeley,<sup>14</sup> and Sierra Club and Plug in America,<sup>15</sup> which all focus on the central theme of overcoming barrier to accessing charging infrastructure.

***a. Identify possible solutions to overcome regulatory barriers.***

The Commission can provide guidance based on the barriers above for the utilities to file EV program proposals to address each of these barriers. This has been done at Utilities Commissions across the country including in California, Connecticut, and New York. For example, since 2011, the California Public Utilities Commission has issued numerous rulings guiding the utilities' investment in transportation electrification.<sup>16</sup> The regulatory code also specifically states that:

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<sup>12</sup> Make-ready: Service connection and supply infrastructure to support EV charging comprised of the electrical infrastructure from the distribution circuit to the stub of the Electric Vehicle Supply Equipment (EVSE). It can include equipment on the utility-side (e.g. transformer) and customer-side (e.g. electrical panel, conduit, wiring) of the meter. D.18-05-040. CA PUC. Page 5.

<sup>13</sup> Fitzgerald, Garrett and Chris Nelder. From Gas to Grid: Building Charging Infrastructure to Power Electric Vehicle Demand. Rocky Mountain Institute, 2017. [https://www.rmi.org/insights/reports/from\\_gas\\_to\\_grid](https://www.rmi.org/insights/reports/from_gas_to_grid)

<sup>14</sup> Elkind, Ethan. Plugging Away: How to Boost Electric Vehicle Charging Infrastructure. June 2017. <https://www.law.berkeley.edu/wp-content/uploads/2017/06/Plugging-Away-June-2017.pdf>

<sup>15</sup> AchiEVe: Model State & Local Policies to Accelerate Electric Vehicle Adoption: A Policy Toolkit. Sierra Club and Plug in America. June 2018. [https://pluginamerica.org/wp-content/uploads/2018/06/AchiEVe-Policy-Toolkit-2.0\\_2018.pdf](https://pluginamerica.org/wp-content/uploads/2018/06/AchiEVe-Policy-Toolkit-2.0_2018.pdf)

<sup>16</sup> R.13-11-007. Assigned Commissioners Ruling Regarding the Filing of the Transportation Electrification Applications Pursuant to Senate Bill 350. CA PUC. September 2016. <http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M167/K099/167099725.PDF>

“Deploying electric vehicle charging infrastructure should facilitate increased sales of electric vehicles by making charging easily accessible and should provide the opportunity to access electricity as a fuel that is cleaner and less costly than gasoline or other fossil fuels in public and private locations.” Similar guidance could be established in Illinois to help drive EV infrastructure deployment.

Through Tesla’s experience working with utilities on establishing new service for charging stations, Tesla has found that single points of contact or a dedicated team at the utility to handle electric vehicle supply equipment (EVSE) service requests has helped streamline the development process and improve communication. Moreover, consultative site walks with utility engineers prior to submitting the service request can help inform site plans, reduce delays and lower development costs.

***B. Describe economic barriers to increased electrification of the transportation sector.***

See response to A.

***a. Identify possible solutions to overcome economic barriers.***

See response to A.

***C. Describe any other barriers to increased electrification of the transportation sector.***

Numerous studies demonstrate that lack of awareness and education continues to be a barrier for transportation electrification. For example, a recent MJ Bradley & Associates study concluded that “consumers are often unfamiliar with the ins-and-outs of PEV ownership, including the vehicle models currently available, financial incentives offered at the federal and state levels, the costs of PEV ownership, and charging options and locations.”<sup>17</sup>

***a. Identify possible solutions to overcome those barriers.***

As trusted sources of information, utilities can educate residential, and commercial and industrial customers about EVs, where and how they can charge their vehicles, and about general costs for using electricity relative to oil-consuming vehicles.

***D. Should Illinois prioritize overcoming certain barriers over other barriers?***

Given that access to charging infrastructure is one of the primary barriers to transportation electrification and EV adoption, Illinois should focus on overcoming barriers that will help enable deployment such as providing incentives for make-ready infrastructure investment and charging stations to help decrease the cost.

As stated in the introduction above, using a collaborative process with clear timelines and incorporating the many perspectives of EV stakeholders, with utilities and policy makers at the center, will help educate and steer Illinois in

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<sup>17</sup> Jones, Brian, Grace Vermeer, Kim Voellmann, and Paul Allen. Accelerating the Electric Vehicle Market: Potential Roles for Utilities in the Northeast and Mid-Atlantic. MJ Bradley & Associates. March 2017.  
[https://www.mjbradley.com/sites/default/files/MJBA\\_Accelerating\\_the\\_Electric\\_Vehicle\\_Market\\_FINAL.pdf](https://www.mjbradley.com/sites/default/files/MJBA_Accelerating_the_Electric_Vehicle_Market_FINAL.pdf)



developing programs that encourage EV adoption and savings in the state—as the growth of EVs complements established objectives in Illinois of promoting clean energy and reducing greenhouse gas emissions.

Benefits:

**A. Describe the cost benefits associated with increased EV deployment in Illinois.**

The Electric Vehicle Act of Illinois originally found “that the adoption and use of electric vehicles would benefit the State of Illinois by (i) improving the health and environmental quality of the residents of Illinois.”<sup>18</sup> MJ Bradley & Associates further quantified the impact of EVs and found that the proliferation of EVs can provide significant net benefits to both ratepayers and citizens in Illinois by 2050. Depending on the number of EVs on the road, the benefits quantified are upwards of 12 to 42 billion dollars<sup>19</sup> in savings. The study, “...estimated the benefits that would accrue to all electric utility customers in Illinois due to greater utilization of the electric grid during off-peak hours, and increased utility revenues from plug-in electric vehicle (PEV) charging. In addition, the study estimated the annual financial benefits to Illinois drivers from owning PEVs—from fuel and maintenance cost savings compared to owning gasoline vehicles—and societal benefits resulting from reduced gasoline consumption and associated greenhouse gas (GHG) emissions.”<sup>20</sup> These benefits studied are only realized so long as there is high penetration of EVs where today, EVs make up only .12 percent of registered vehicles on the road in Illinois,<sup>21</sup> which means there is a long road ahead to get from the .12 percent or roughly 12,300 plug-in electric vehicles<sup>22</sup> in the state today to 6.6 million vehicles by 2050 where billions of dollars in benefits are realized.

**a. What is the effect on the State?**

See above response to A.

**b. What is the effect on individual EV owners?**

As more EVs are deployed, the cost of EVs can significantly decrease which is primarily driven by the cost of batteries. MJ Bradley & Associates “projects that the average annual cost of owning a PEV in Illinois will fall below the average cost of owning a gasoline vehicle by 2030, even without government purchase subsidies.”<sup>23</sup>

**B. Describe the environmental benefits associated with increased EV deployment in Illinois.**

As NRDC previously referenced, on today’s grid, EVs emit about 70 percent less GHG emissions than their gasoline counterparts in Illinois.<sup>24</sup> The MJ Bradley & Associates study also found that a cumulative \$5.6 billion will

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<sup>18</sup> 20 ILCS 627. Electric Vehicle Act.<http://www.ilga.gov/legislation/ilcs/ilcs3.asp?ActID=3348&ChapterID=5>

<sup>19</sup> Jones, Brian, Grace Vermeer, Kim Voellmann, and Paul Allen. Accelerating the Electric Vehicle Market: Potential Roles for Utilities in the Northeast and Mid-Atlantic. MJ Bradley & Associates. March 2017. Page 1.

[https://www.mjbradley.com/sites/default/files/MJBA\\_Accelerating\\_the\\_Electric\\_Vehicle\\_Market\\_FINAL.pdf](https://www.mjbradley.com/sites/default/files/MJBA_Accelerating_the_Electric_Vehicle_Market_FINAL.pdf)

<sup>20</sup> *Id.* Reference Page i.

<sup>21</sup> MJ Bradley & Associates modeled the benefits of EVs under a high penetration scenario using both MISO’s forecast and Bloomberg’s forecast of electric vehicles on the road in Illinois by 2050. Today, MJ Bradley & Associates assume that roughly of the 10+ million Light-duty vehicles on the road today, roughly .12 of this vehicle total is made up of electric vehicles. *Id.* Page ii.

<sup>22</sup> Includes both battery and plug-in hybrids. *Id.* Page 1.

<sup>23</sup> Electric Vehicles Cost Benefit Analysis: Plug-In Electric Vehicle Cost Benefit Analysis: Illinois. MJ Bradley & Associates. September 2017.

Page 11. <https://www.sierraclub.org/sites/www.sierraclub.org/files/uploads-wysiwig/IL%20PEV%20CB%20Analysis%20FINAL%2026sep17.pdf>

<sup>24</sup> Garcia, Noah. Illinois Sees Widespread Benefits from Electrifying Vehicles. September 2017. <https://www.nrdc.org/experts/noah-garcia/illinois-sees-widespread-benefits-electrifying-vehicles>

accrue to society at large through reduced GHG emissions by 2050.<sup>25</sup> Beyond environmental benefits, it also important to consider the health and air quality benefits from EVs. Illinois has had challenges with particulate matter and nitrogen oxide emissions which has put many in the state at risk of health issues. The most recent data from the American Lung Association estimates that there were more than 175,000 cases of pediatric asthma, and 716,000 cases of adult asthma in Illinois.<sup>26</sup> The American Lung Association found that by moving to a “Zero Emission Vehicle Future,” programs in these 10 states can collectively save society \$33.3 billion in health and climate costs in 2050 and reduce thousands of hospitalizations, illnesses and premature deaths.<sup>27</sup>

***a. Compare environmental benefits to the environmental detriment if additional EV and charging infrastructure is not developed and deployed.***

Tesla does not have any comment at this time.

***b. Describe the environmental effect of EVs on the environment over the lifespan of an EV.***

According to a report by the Union of Concerned Scientists (UCS) “battery electric cars generate half the emissions of the average comparable gasoline car, even when pollution from battery manufacturing is accounted for.”<sup>28</sup>

***C. Describe any other benefits associated with increased EV deployment.***

There are direct ratepayer benefits in the form of downward pressure on rates due to higher utility revenues associated with increasing electricity sales. The electricity system is comprised of significant fixed costs. Increasing the utilization of the fixed costs, especially during off-peak periods, reduces the per unit cost of the fixed assets. RMI summarized several studies looking at the ratepayer benefit of EVs and found a range of \$744 to \$9607 of total lifetime benefits per EV.<sup>29</sup>

EV Charging Infrastructure:

***A. Describe whether more charging stations should be developed in Illinois.***

The relatively small number of EVs currently in Illinois provides decision makers with an opportunity to develop programs that increase EV adoption while taking time to monitor the programs and about the needs of consumers if Illinois’ transportation sector is electrified. Illinois should use the information available to them to consider their options in implementing programs. For example, RMI, NREL and others have studied the required steps and status of EV charging infrastructure to help increase EV adoption and maximize their utilization of the electric grid. From these studies, there is an inherent understanding that the primary way to promote EV adoption and utilization

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<sup>25</sup> *Ibid*

<sup>26</sup> State of the Air 2018. American Lung Association. Page 87. <https://www.lung.org/assets/documents/healthy-air/state-of-the-air/sota-2018-full.pdf>

<sup>27</sup> Clean Transportation. American Lung Association. <https://www.lung.org/local-content/california/our-initiatives/clean-transportation.html>

<sup>28</sup> Cleaner Cars from Cradle to Grave. Union of Concerned Scientists. 2015. <https://www.ucsusa.org/clean-vehicles/electric-vehicles/life-cycle-ev-emissions#.W8efN3tKg-U>

<sup>29</sup> Fitzgerald, Garrett and Chris Nelder. From Gas to Grid: Building Charging Infrastructure to Power Electric Vehicle Demand. Rocky Mountain Institute, 2017. [https://www.rmi.org/insights/reports/from\\_gas\\_to\\_grid](https://www.rmi.org/insights/reports/from_gas_to_grid)

is through improving access and the development of EV charging infrastructure. A NREL study determined that to facilitate 15 million PEVs by 2030, there is a potential need to develop public charging of approximately 600,000 chargers, or 40 plugs per PEV.<sup>30</sup>

Furthermore, under the Volkswagen (VW) settlement funds allocated to Illinois, the Beneficiary Mitigation Plan provides up to 10%, or approximately \$10 million, to investment in light-duty zero emission vehicle (ZEV) supply equipment. The BMP also states that Illinois “intends on funding light duty zero emission vehicle supply equipment in later funding rounds.”<sup>31</sup> Given the need to increase access to charging infrastructure today, which is only expected to grow over time as EV growth accelerates Illinois, and that these additional VW funds will likely not be available for some time, it is important to focus on providing near term opportunities for additional investment and overcoming barriers to charging infrastructure access in the state today.

***a. What external sources could be used to identify the optimal ratio of EVs to charging stations?***

The National Renewable Energy Laboratory (NREL) has developed a tool called EVI-Pro that can help determine a baseline for the amount of charging infrastructure that should be deployed to support a certain percentage of EVs. Any baseline for the deployment of charging infrastructure should be tied to any EV deployment targets that Illinois expects based on current market trends or any specific goals that the state will set in the future. At the same time, this information could be supplemented by a recommendation from the utility on the needed amount of charging infrastructure that is tailored to its specific service territory. Any deployment ratio should consider that a majority of charging takes place at home and consider access to charging where you park with a focus on Level 2 infrastructure first to provide expanded access today.

***b. Describe the rate at which additional public charging infrastructure needs to be developed to meet the demand of increasing numbers of EVs in Illinois.***

See response to section A above.

***c. To what extent and at what rate do customer-owned chargers need to be developed?***

Providing access to Level 2 charging whether at home or work will play an important role in increasing EV adoption. Whether or not a customer needs to own the charger is not as relevant as providing access and customer choice as to the type of charging equipment that is utilized in a residential setting.

***B. Identify the costs associated with installing additional charging infrastructure throughout the state. Assume that installation includes distribution build out, customer make-ready work, ad charging equipment.***

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<sup>30</sup>Wood, Eric, Clément Rames, Matteo Muratori, Sessa Raghavan, and Marc Melaina. National Plug-In Electric Vehicle Infrastructure Analysis. September 2017. Page XI. <https://www.nrel.gov/docs/fy17osti/69031.pdf>

<sup>31</sup> Beneficiary Mitigation Plan Volkswagen Environmental Mitigation Trust Agreement. Illinois Environmental Protection Agency. August 2018. Page 15. <https://www2.illinois.gov/epa/Documents/iepa/air-quality/vw-settlement/Illinois%20Beneficiary%20Mitigation%20Plan.pdf>.

Various factors determine the costs of each of the components of deploying charging infrastructure. This includes site specific factors such as where the charging station is located, how close it is to the electrical service, whether a new service connection is needed and how the charging station will be used, among other items. A report from the Idaho National Laboratory quantified the average cost of charging equipment at each charging level several years ago, which could serve as a baseline for any cost discussions today.<sup>32</sup> It could also be useful to examine recent utility filings in other states across the country including California where the utilities have had to detail cost estimates and provide updated quarterly reports on the costs to deploy infrastructure through their current multifamily and workplace charging programs.<sup>33</sup>

***a. Describe who would carry the costs of each aspect of building additional charging infrastructure.***

Utilities, charging providers, state and local governments, and private entities will each have a role to play in helping to build out the additional charging infrastructure that is needed to support EV deployment in Illinois. One key role for utilities is to help provide programs that cover the cost of the make-ready infrastructure as well as a component of the cost of the charging equipment. These investments can include rebates for the charging equipment with contribution requirements from the recipient.

***b. Describe whether ratepayer funds would pay for any aspect of building charging infrastructure.***

Given the benefits provided by EVs and investment in charging infrastructure to all ratepayers and the studies that have demonstrated this, utilities have an important role to play in utilizing ratepayer funds to drive transportation electrification. Parameters around these general investments should be prudently defined and metrics should be put in place to ensure the benefit of these investments over time.

***C. Describe whether additional charging stations should be installed in densely populated areas, in areas outside densely populated cities, or both.***

Providing access to charging infrastructure will be important in urban and non-urban contexts. Building out a network for long distance travel will help drive customer confidence in owning an EV. At the same time, since most customers charge where they park at home, providing access to charging infrastructure to apartment dwellers, renters and those who in general do not have access to home charging is critically important to drive EV adoption. Funding programs should therefore focus on investment in Level 2 charging infrastructure for multifamily buildings and workplaces first while at the same time encouraging investment in public charging stations.

***a. Describe how EV charging infrastructures could penetrate low income communities that generally do not have high EV adoption.***

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<sup>32</sup> Plugged In: How Americans Charge Their Electric Vehicles. Idaho National Laboratory. Page 18.

<https://avt.inl.gov/sites/default/files/pdf/arra/PluggedInSummaryReport.pdf>

<sup>33</sup> Quarterly Program Report. EV Charge Network Resources. Pacific Gas and Electric Company. [https://www.pge.com/en\\_US/business/solar-and-vehicles/your-options/clean-vehicles/charging-stations/program-participants/resources.page](https://www.pge.com/en_US/business/solar-and-vehicles/your-options/clean-vehicles/charging-stations/program-participants/resources.page)

Providing access to charging infrastructure in low income communities is just as important as providing access to charging infrastructure generally. Many of the policy and program options discussed throughout our comments could include a specific focus on low income communities. In California, there are many different programs focused on enabling access to charging infrastructure in low income communities including the Charge Ahead California campaign.<sup>34</sup> Per Senate Bill (SB) 350, the California Air Resources Board (ARB) developed a study that analyzes overcoming barriers to clean transportation access in low income communities, which could provide useful context and recommendations.<sup>35</sup>

***D. Discuss ownership of charging stations.***

At this early stage of charging station development and EV adoption, it is important to remove barriers to EVSE deployment and to quickly resolve threshold questions about the utility's role so that programs can be developed just as more EV models come to market and customer adoption grows. The Commission can provide utilities with general guidance about their role in increasing access to charging infrastructure (and how such costs can be recovered), such as designing charging station rate programs, examining line extension policies, and under what circumstances and how utilities can invest directly in charging station. General guidance and quickly resolving threshold questions is important at this early stage as it allows different models to be tested and for utilities to design programs that they believe best fit the needs of their customers and service areas. As previously noted, Tesla's charging networks are not intended to be a profit center. Tesla welcomes all investments in charging stations, including investment by utilities so long as their programs maintain a level playing field for all charging station provider participants. Tesla believes competition can help improve customer access to charging, charging network reliability, and ultimately provide EV owners with a great user experience

***a. Discuss whether utilities should own charging stations. Explain why or why not.***

See response to D above.

***b. Discuss whether third party vendors should own the charging stations. Explain why or why not.***

See response to D above.

***E. Describe whether charging stations should consist of DC Fast Chargers, slow chargers, or a mixture of both. Explain why.***

A combination of both DCFC and Level 2 should be deployed to drive EV adoption. As mentioned previously, for a majority of EV drivers, the best place to charge is where you park. It is therefore important to deploy Level 2 chargers at homes, multifamily buildings, workplaces and in public destinations such as retail centers, schools, parks and other facilities. DCFC is best utilized for long distance road trips or for those who do not have easy access to home or workplace charging in urban centers.

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<sup>34</sup> Charge Ahead California. Environment California. <https://environmentcalifornia.org/programs/cae/charge-ahead-california>

<sup>35</sup> Low -Income Barriers Study, Part B: Overcoming Barriers to Clean Transportation Access for Low -Income Residents. CA Air Resources Board. February 2018. <https://ww2.arb.ca.gov/resources/documents/carb-barriers-report-final-guidance-document>

As the range of EVs increases to 250 or more miles, the average commuter will be able to utilize Level 2 charging at home or work to meet their daily commuting needs. While increased charging speeds under DCFC may be beneficial for long distance trips or those drivers that are covering a much longer distance than the average commute each day, it should not be relied upon to move charging toward a gas station model. Most cars sit idle for more than 20 hours a day while people are at stores, at work, and at home. That presents an opportune time to charge a vehicle.

***F. What other utility service options, especially those currently offered in other jurisdictions, could promote EV adoption?***

Tesla does not have any comment at this time.

***G. What kinds of building code considerations should be kept in mind?***

Building codes should take into consideration the future growth of EVs in Illinois and evaluate opportunities to include requirements for EV readiness for new construction. Buildings constructed today will last for 50+ years. Retrofitting parking structures is at least 4 to 8 times more expensive than outfitting garages at initial construction, with residents often bearing these costs. When installed during initial construction, EV charging infrastructure costs are generally less than 1% of the total building construction cost. Therefore, it is important for Illinois to evaluate increasing EV readiness requirements for new construction at both the state and local level.

***H. What kinds of ordinance changes can help encourage EV adoption?***

Local ordinances can play an important role in facilitating the rate and scale of EV charging infrastructure deployment. Streamlining local permitting processes for EV charging station development is important to ensure that projects do not have to undergo extensive reviews. Once local jurisdictions have a better understanding of the types of charging infrastructure (Level 2 or DCFC) that will be deployed they can create streamlined processes with permitting checklists like what has been done for other technologies.

Furthermore, ensuring that EV charging stations are figured into parking space requirements is important. For instance, EV charging stations should not require installation of additional parking spots or take away from total parking counts. This can be addressed in local zoning codes to help encourage the installation of EV charging stations.

Finally, creating policies that allow owners and renters to install charging stations in apartment complexes with dedicated parking spots is important. If the process is too burdensome, potential EV adopters may become discouraged and make the switch to an EV.

The final report from the Electric Vehicle Advisory Council (EVAC) in 2011 included recommendations for local government support of charging infrastructure deployment, several of which could be utilized today and could be re-evaluated.<sup>36</sup>

***I. What other municipal codes can encourage EV adoption?***

See response to H above.

***J. Describe technical standards, guidelines, and best practices to manage EV charging standards.***

While it is important to ensure that charging equipment that is deployed meets applicable safety standards, such as being certified by a Nationally Recognized Testing Lab, any program requirements for charging standards should not be overly prescriptive at the nascent stage of the industry and should rather focus on scaling infrastructure deployment first and foremost.

At the same time, it is important to recognize where it is appropriate for the Commission to set standards (whether for billing, interoperability, communications or the actual connector). For instance, it is inappropriate to dictate the types of investments, technologies or business models that private companies should adopt on their side of the meter.

Improving a customer's experience with EV charging is important for increasing EV adoption, however, there are variety of factors that likely have a greater impact on a customer's charging experience than standards. These include the location of the charging station relative to amenities, the availability of numerous charging stalls to mitigate congestion, the rate (speed) of charge, pricing, reliability and maintenance of the equipment, to name a few. To date, no Public Utility Commission in North America has adopted interoperability standards or "single-protocol" for charging stations. For publicly funded charging stations, the Commission can determine applicable standards as it deems appropriate like what has been done in California.<sup>37</sup>

Ratemaking:

***A. Describe whether utilities should charge time-varying rates, such as time-of-use rates, to incentivize EV penetration in the state. Explain why or why not.***

While TOU rates may not directly incentivize EV penetration in Illinois. Any customer facing rates and programs should be flexible and designed carefully so that customer satisfaction of EV ownership remains high. Customer choice for rates is important, particularly for residential customers. Some customers may be comfortable with shifting their entire home to TOU rates because they can change their consumption behavior, others may be less willing to try TOU because of uncertainty about what the impacts will be on their routines or electric bills. Therefore, a good strategy is to explore voluntary TOU rates or programs that mimic TOU rates.

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<sup>36</sup> Illinois Electric Vehicle Advisory Council Final Report. December 2011.  
<https://www2.illinois.gov/dceo/aboutdceo/reportsrequiredbystatute/20111230evacfinalreport.pdf>

<sup>37</sup> Transportation Electrification Activities Pursuant to Senate Bill 350. CA Public Utilities Commission. <http://www.cpuc.ca.gov/sb350te/>

Most utilities have a provision that allows EV customers to receive a credit following the first year of enrollment in a TOU rate for the difference, if any, between what the customer paid on the TOU rate and what the customer would have paid on the non-TOU residential rate. Essentially providing customers with a risk-free trial for switching to a TOU rate is a good way to encourage additional customers to enroll in the rate. One area of potential improvement for the TOU rates is to reduce the length of the on-peak period so that it is easier for customers to change their behavior.

***a. How would EV drivers benefit from these rates?***

See response to A above.

***B. Discuss whether charging infrastructures should be included in the rate base if the charging infrastructure is owned by public utilities. Explain why or why not.***

Tesla does not have any comment at this time.

***a. Discuss whether charging infrastructures should be accounted for as capital expenses. Explain why or why not.***

Tesla does not have any comment at this time.

***b. Discuss whether charging infrastructures should be accounted for as operational expenses. Explain why or why not.***

Utilities play an important role in the adoption of EVs and deployment of charging infrastructure. Tesla believes utilities should be able to recover costs associated with EV programs as long as they are prudently incurred, and that utilities should also be encouraged to invest in EV programs. Tesla does not have a position regarding whether costs are included in rate base, capital expenses or operating expenses.

***C. What rate designs have other utilities implemented to encourage EV adoption and how successful have they been?***

Tesla is supportive of demand charge-free or reduced rates for commercial customers deploying both Level 2 and DCFC charging. For DCFC, demand charges represent a significant barrier to the development of DCFC infrastructure. A recent study conducted by the Rocky Mountain Institute found that when utilization of DCFC stations is low, which is common given the nascent nature of EV technology, demand charges can account for up to 90% of a station's monthly electricity bill, resulting in prohibitively high operating costs.<sup>38</sup> This conclusion is also consistent with the findings of a 2015 study commissioned by New York State Energy Research and Development Authority ("NYSERDA").<sup>39</sup> For similar reasons, demand charges can present problems for commercial customers deploying Level 2 workplace or fleet charging.

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<sup>38</sup> Fitzgerald, Garrett and Chris Nelder. EVgo Fleet and Tariff Analysis. RMI. 2017. Page 1. [https://www.rmi.org/wpcontent/uploads/2017/04/eLab\\_EVgo\\_Fleet\\_and\\_Tariff\\_Analysis\\_2017.pdf](https://www.rmi.org/wpcontent/uploads/2017/04/eLab_EVgo_Fleet_and_Tariff_Analysis_2017.pdf).

<sup>39</sup> Electricity Rate Tariff Options for Minimizing Direct Current Fast Charger Demand Charges, Final Report. Energetic Incorporated, prepared for NYSEDA. December 2015. Page 1. <https://www.nyserda.ny.gov/-/media/Files/Publications/Research/Transportation/Electricity-Rate-Tariff-Options.pdf>



As utilization of charging stations increases, and charging station operating costs are less driven by high peaks in demand, typical three-part tariffs may make sense as a long-term rate design. However, in the current climate of lower charging stations utilization, commercial rates should focus on demand charge holidays or reduced rates over the short- to medium-term periods and transition to a longer-term rate design. Such programs would enable charging station operators to mitigate high operating and development costs for Level 2 and DCFC while EV adoption and charging station utilization increase. The phased in approach will also allow for possible demand management technologies to come down cost.

Utility	Commercial EV Charging Rate Design
Southern California Edison, CA	Approved demand charge free rate for all non-residential charging load for a five-year period, followed by the phase-in of a modest demand charge over the following five years. Time-of-use (TOU) volumetric energy charges increased to recover costs previously recovered in the demand charge.
Eversource, CT	Approved demand charge free rate for all DCFC charging load with increase in volumetric energy charge to recover costs previously recovered in the demand charge. No limit on term of rate offering.
NV Energy (North and South territories), NV	Approved DCFC rate with a ten-year transitional demand charge (2019-2028).
Con Edison, NY	Approved economic development rate for DCFC, that includes a demand charge discount for seven years.
Pacific Power, OR	Approved rate beginning with a demand charge discount of 90%, phasing in at 10% per year until the demand charge is restored at 100%. Volumetric energy charges are adjusted to recover costs previously recovered in demand charges.
PECO, PA	Proposed five-year pilot rate in which the customer receives a fixed demand credit, initially equal to 50% of the combined maximum nameplate capacity rating for all DCFCs connected to the service to the customer's billed distribution demand. Pending final approval
National Grid, RI	Approved DCFC Discount Pilot that provides a distribution demand charge credit for three years.

#### Regulatory Treatment of EVs and Charging Stations:

##### ***A. Discuss whether EVs should be treated as distributed energy resources (DERs) for regulatory purposes. Explain why or why not.***

Given the relatively low uptake of EVs and limited customer experience of using EVs as DER, Tesla recommends that a determination not be made at this time. Instead, Tesla recommends that the Commission continue to monitor the uptake of EVs and deployment of DER, while also tracking customer participation and preferences with using their vehicles and EVSE as DER or grid resources.

***a. Discuss whether passenger cars, transportation vehicles, and corporate fleets should be treated equally. Should one type be favored over others?***

***Explain why or why not.***

Given that transportation electrification will need to cover the entire ecosystem of available transit options including light, medium and heavy-duty vehicles, it would not be appropriate to favor one over the other. However, the need to increase access to charging infrastructure is critically important today, especially in the light-duty vehicle market. Therefore, the Commission should evaluate transportation electrification holistically over the long term, especially when looking at future infrastructure needs for heavy-duty trucks, and with a near term emphasis on driving adoption of light-duty EVs.

***b. How can unique demand response programs be structured for each customer classification?***

Given the current level of EV adoption in Illinois, generally, EVs or charging stations as a potential source of demand response should not be viewed or treated separately from other demand response mechanisms. Instead, EVs can be one of many tools that customers can utilize when they participate in demand response programs. For example, a customer receiving a demand response signal may prefer to cycle their air conditioner rather than curtailing their EV charge rate, and the grid is agnostic as to how the demand reduction occurred.

***B. Discuss how common charging stations should be categorized for regulatory and accounting purposes.***

Tesla does not have any comment at this time.

***C. Discuss how privately-owned charging stations should be categorized for regulatory purposes.***

Tesla does not have any comment at this time.

***a. Should common charging stations and privately-owned charging stations enjoy the same regulatory and accounting treatment?***

Tesla does not have any comment at this time.

***D. Discuss what kinds of incentives could be implemented to encourage further EV penetration into the US markets.***

Many studies have analyzed opportunities for increasing EV penetration in U.S. markets, several of which have been discussed in our comments above regarding charging infrastructure access and education and outreach. Recent studies on this specific topic include NASEO's PEV Policy Evaluation Rubric<sup>40</sup> and NREL's Barriers to the Acceptance of PEVs.<sup>41</sup>

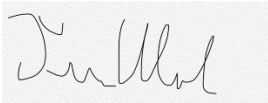
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<sup>40</sup> PEV Policy Evaluation Rubric: A Methodology for Evaluating the Impact of State and Local Policies on Plug-in Electric Vehicle Adoption. NASEO. September 2018. <https://naseo.org/news-article?NewsID=3321>

<sup>41</sup> Singer, Mark. The Barriers to Acceptance of Plug-in Electric Vehicles: 2017 Update. NREL. <https://www.nrel.gov/docs/fy18osti/70371.pdf>

Tesla appreciates the opportunity to provide feedback on the NOI regarding electric vehicles and charging infrastructure access.

Sincerely,

A handwritten signature in black ink, appearing to read 'Francesca Wahl', on a light gray rectangular background.

Francesca Wahl  
Senior Policy Associate  
[fwahl@tesla.com](mailto:fwahl@tesla.com)  
650-435-0422